

Testing and Verification for the SOAREX-7 TDRV Flight (IPPW-7)

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ABSTRACT

The NASA SOAREX (Sub Orbital Aerodynamic Re-entry EXperiments) missions offer an affordable and reliable channel to mature new EDL technologies and facilitate student involvement in this field. The successful SOAREX-7 flight test of the TDRV (Tube Deployed Re-entry Vehicle) in May 2008 investigated the feasibility and dynamics of a re-entry vehicle that utilized a mechanically-deployable aft deceleration flare for low ballistic coefficient entry with high stability. Contributors to this launch included experienced NASA Ames / Wallops team members and mentors along with student participation from San Jose State University and the University of Idaho. Extensive testing and verification of the TDRV was done prior to flight to support analysis of the vehicle and ensure survivability of the system. Testing of the TDRV included arc-jet evaluation of shock interaction and heat transfer characteristics, ballistic range stability verification, laser heating tests of deployable fabrics, and component-level testing for flight preparation. The results of testing and verification concluded that the TDRV design concept was indeed feasible and well-suited for the launch and re-entry environments anticipated in the SOAREX-7 flight. Testing has also shown the potential for the TDRV to be used at much higher re-entry velocities with greater heat flux for a wide range of EDL missions. Further development of the existing TDRV work in addition to future SOAREX flights shows promise that the TDRV will be a robust, inexpensive, and stable aeroshell for future missions.

A poster will be presented at the IPPW-7 conference. The poster will overview the testing and verification that was performed on the TDRV vehicle in preparation for the SOAREX-7 flight in May 2008.